IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Fathi Hassan Ghorbel et al.	Confirmation No.:	2522
Serial No.:	10/730,233	Group Art Unit:	3617
Filed:	December 8, 2003	Examiner:	R. J. McCarrry Jr.
For:	Autonomous Robotic Crawler for In-Pipe Inspection	Docket No.:	1789-08603

RESPONSE TO NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF (37 CFR 41.37) AND RE-SUBMITTED APPEAL BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Date: June 9, 2006

Sir:

Appellant hereby submits this response to the Notification of Non-Compliant Appeal Brief (37 CFR 41.37) dated May 10, 2006 and resubmits an Appeal Brief in connection with the above-identified application. A Notice of Appeal was filed via facsimile on January 11, 2006.

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I. REAL PARTY IN INTEREST

The real party in interest is the William Marsh Rice University ("Rice"), a non-profit university, having its principal place of business in Houston, Texas. The Assignment from the inventors to Rice was recorded on May 10, 2004, at Reel/Frame 014614/0805.

II. RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any related appeals or interferences.

III. STATUS OF THE CLAIMS

Originally filed claims:	1-26.
Claim cancellations:	2.
Added claims:	None.
Presently pending claims:	1 and 3-26.
Presently allowed claims:	7-10 and 20-23.
Presently objected to claims (allowable if rewritten in independent form):	None.
Presently appealed claims:	1-6, 11-19, and 24-26.

IV. STATUS OF THE AMENDMENTS

An After-Final amendment was submitted on November 10, 2005.

The After-Final amendment was not entered.

The attached APPENDIX I contains a clean copy of the claims in their current state, without the amendments submitted in the After-Final amendment.

The attached APPENDIX II contains a marked-up copy of the claims, showing the un-entered amendments submitted in the After-Final amendment.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

In accordance with at least one embodiment of the invention, a robotic pipe crawler is disclosed. An exemplary embodiment of a pipe crawler is shown in Figure 1 and described in the associated text in at least pages 4-6 of Appellant's disclosure. The autonomous robot comprises:

a first section **[para. [0017], ref. # 22]** having a plurality of pitched wheels **[para. [0018], ref. # 30]** that are each positioned at a different point along the length of the robot **[para. [0020], Figures 9, 11, 13, 14]**;

a second section **[para. [0017], ref. # 24]** rotatably connected to said first section and having a plurality of wheels aligned parallel to the longitudinal axis of the conduit; and

means for causing rotation of one of said first and second sections relative to the other of said first and second sections **[para. [0017], ref. # 56]**.

Because of the presence of the pitched and non-pitched wheels on their respective sections, relative rotation of the first and second sections causes the robot to advance within a pipe.

In some embodiments, at least one wheel is moveable between a first position in which all of the wheels on the same section contact the conduit and a second position in which at least one of said of the wheels is retracted **[para. [0022]]**.

In other embodiments, at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit **[para. [0028], ref. # 76]**.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-6, 11, 12, 15-19 and 24 are anticipated under 35 U.S.C. § 102(b) by Simpson (U.S. Pat. No. 5,649,603).

Whether claims 13, 14, 25 and 26 are obvious under 35 U.S.C. § 103(a) over Simpson in view of Ng et al. (U.S. Pat. No. 6,162,171).

The Examiner concluded that claims 7-10 and 20-23 contain allowable subject matter and thus such claims are not at issue in this appeal.

VII. ARGUMENT

The appealed claims stand or fall together.

Claims 1-6, 11, and 12

Appellant has grouped these claims together for purpose of this appeal. However, that these claims have been grouped together should not be used to construe the scope of the claims or the limitations contained therein. Differences in scope and limitation meaning may exist apart from the issues raised in this appeal. Appellant selects independent claim 1 as representative of this group.

Claim 1 requires that each of the pitched wheels be positioned at a different point along the length of the robot. In support of his assertion that Simpson anticipates claim 1, the Examiner states:

> Sets of pitched wheels are positioned at different points along the length of the vehicle. As shown in Figure 10, there is a set of wheels on section 808 and another set on section 812. On each section 808 and 812, the wheels are positioned at different points around the axis of the vehicle. The wheels are also positioned in the same azimuthal position about the vehicle.

Notably, the Examiner does not state that Simpson includes pitched wheels that are each positioned at a different point along the length of the robot, as required by claim 1. This is because Simpson teaches only sets of pitched wheels, i.e. groups of two or more pitched wheels that are positioned at the same axial location. All of the wheels of Simpson are grouped in sets and all of the wheels in each set are positioned at the same point along the length of the robot. Thus, Simpson clearly cannot support an anticipation rejection. For these reasons, the Examiner erred in rejecting claim 1 over Simpson.

The Examiner also used Simpson to reject some of the claims as obvious. Ng does not satisfy the deficiencies of Simpson explained herein. Based on the foregoing, Appellant respectfully submits that the rejections of the claims in this first grouping be reversed, and the claims set for issue.

Claims 15-19 and 24

Appellant has grouped these claims together for purpose of this appeal. However, that these claims have been grouped together should not be used to construe the scope of the claims or the limitations contained therein. Differences in scope and limitation

meaning may exist apart from the issues raised in this appeal. Appellant selects independent claim 15 as representative of this group.

Independent claim 15 requires that each of the pitched wheels be positioned at a different point along the length of the robot. As explained above, none of the cited art discloses of this limitation. For at least this reason, the Examiner erred in rejecting claim 15. Based on the foregoing, Appellant respectfully submits that the rejections of the claims in this second grouping be reversed, and the grouping set for issue.

The Examiner also used Simpson to reject claims 16-19 and 24 as obvious. Ng does not satisfy the deficiencies of Simpson explained herein. Based on the foregoing, Appellant respectfully submits that the rejections of the claims in this first grouping be reversed, and the claims set for issue.

Interview and After-final Amendment

Because Appellants believe that the pending claims are clearly distinguishable over the art of record, Appellants submitted an after-final amendment intended to emphasize the distinctions over the art. Upon submitting this amendment, however, Appellants were advised that it would not be entered on the ground that it is redundant. Appellants agree that it is redundant, however Applicants submit that the limitation in the claims that renders the amendment redundant also distinguishes the claims over the art.

For purposes of illustration, the After-Final amendment is attached hereto as CLAIMS APPENDIX II.

Appellants respectfully submit that the claims in the present form, i.e. without the after-final amendment, are distinguishable and patentable over the art.

Conclusion

For the reasons stated above, Appellant respectfully submits that the Examiner erred in rejecting all pending claims. It is believed that no extensions of time or fees are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Deposit Account No. 03-2769.

Respectfully submitted,

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VIII. CLAIMS APPENDIX I

1. (Currently amended) An autonomous robot for traversing a conduit comprising:

a first section having a plurality of pitched wheels, said pitched wheels being oriented such that each of their axes defines a pitch angle greater than zero degrees and less than ninety degrees with respect to the longitudinal axis of the conduit each of said pitched wheels being positioned at a different point along the length of the robot;

a second section rotatably connected to said first section, said second section having a plurality of wheels aligned parallel to the longitudinal axis of the conduit; and

means for causing rotation of one of said first and second sections relative to the other of said first and second sections;

wherein said relative rotation of said first and second sections provides locomotive motion of the robot.

2. Canceled.

3. (Previously presented) The robot according to claim 1 wherein each of said pitched wheels is positioned at a different azimuthal position about the axis of the robot.

4. (Original) The robot according to claim 1 wherein at least two of said pitched wheels are positioned at the same azimuthal position about the axis of the robot.

5. (Original) The robot according to claim 1 wherein said pitched wheels define at least one helical row.

6. (Original) The robot according to claim 5 wherein adjacent pitched wheels are spaced 180 degrees apart about the axis of the robot.

7. (Previously presented) An autonomous robot for traversing a conduit comprising:

a first section having a plurality of pitched wheels, said pitched wheels being oriented such that each of their axes defines a pitch angle greater than zero degrees and less than ninety degrees with respect to the longitudinal axis of the conduit;

a second section rotatably connected to said first section, said second section having a plurality of wheels aligned parallel to the longitudinal axis of the conduit; and

means for causing rotation of one of said first and second sections relative to the other of said first and second sections;

wherein said relative rotation of said first and second sections provides locomotive motion of the robot; and

wherein at least one wheel is moveable between a first position in which all of said wheels on the same section contact said conduit and a second position in which at least one of said of said wheels is retracted.

8. (Original) The robot according to claim 7 wherein the retraction distance of said at least one wheel is equal to at least one-third the diameter of the wheel.

9. (Original) The robot according to claim 8 wherein the retraction distance of said at least one wheel is equal to at least one-half the diameter of the wheel.

10. (Original) The robot according to claim 8 wherein the retraction distance of said at least one wheel is such that the diameter of the robot is decreased by at least 20 percent upon wheel retraction.

11. (Original) The robot according to claim 1 wherein said wheels have notched traction surfaces.

12. (Original) The robot according to claim 1 wherein at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit.

13. (Original) The robot according to claim 1, further comprising at least two optical encoders.

14. (Original) The robot according to claim 1 wherein the robot is no more than six inches in diameter.

15. (Currently amended) An autonomous robot for traversing a conduit comprising:

a body; and

a drive system capable of extracting energy from a flow of fluid through the conduit and using the energy to advance the body along the inside of the conduit, said drive system including at least one set of pitched wheels mounted on said body, each of said pitched wheels being positioned at a different point along the length of the robot;

wherein at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit.

16. (Original) The robot according to claim 15 wherein said drive system includes a plurality of pitched wheels that are each positioned at a different point along the length of the robot.

17. (Original) The robot according to claim 16 wherein said pitched wheels are each positioned at a different point about the axis of the robot.

18. (Original) The robot according to claim 16 wherein said pitched wheels define at least one helical row.

19. (Original) The robot according to claim 18 wherein adjacent pitched wheels are spaced 180 degrees apart about the axis of the robot.

20. (Previously presented) An autonomous robot for traversing a conduit comprising:

a body; and

a drive system capable of extracting energy from a flow of fluid through the conduit and using the energy to advance the body along the inside of the conduit; said drive system including at least one set of pitched wheels mounted on said body;

wherein at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit; and

wherein at least one wheel is moveable between a first position in which all of said wheels on the same section contact said conduit and a second position in which at least one of said of said wheels is retracted.

21. (Original) The robot according to claim 20 wherein the retraction distance of said at least one wheel is equal to at least one-third the diameter of the wheel.

22. (Original) The robot according to claim 21 wherein the retraction distance of said at least one wheel is equal to at least one-half the diameter of the wheel.

23. (Original) The robot according to claim 22 wherein the retraction distance of said at least one wheel is such that the diameter of the robot is decreased by at least 20 percent upon wheel retraction.

24. (Original) The robot according to claim 15 wherein said wheels have notched traction surfaces.

25. (Original) The robot according to claim 15, further comprising at least two optical encoders.

26. (Original) The robot according to claim 19 wherein the robot is no more than six inches in diameter.

IX. CLAIMS APPENDIX II

1. (Currently amended) An autonomous robot for traversing a conduit comprising:

a first section having a plurality of pitched wheels, said pitched wheels being oriented such that each of their axes defines a pitch angle greater than zero degrees and less than ninety degrees with respect to the longitudinal axis of the conduit each of said pitched wheels being positioned at a different point along the length of the robot such that no two pitched wheels are at the same point along the length of the robot;

a second section rotatably connected to said first section, said second section having a plurality of wheels aligned parallel to the longitudinal axis of the conduit; and

means for causing rotation of one of said first and second sections relative to the other of said first and second sections;

wherein said relative rotation of said first and second sections provides locomotive motion of the robot.

2. Canceled.

3. (Previously presented) The robot according to claim 1 wherein each of said pitched wheels is positioned at a different azimuthal position about the axis of the robot.

4. (Original) The robot according to claim 1 wherein at least two of said pitched wheels are positioned at the same azimuthal position about the axis of the robot.

5. (Original) The robot according to claim 1 wherein said pitched wheels define at least one helical row.

6. (Original) The robot according to claim 5 wherein adjacent pitched wheels are spaced 180 degrees apart about the axis of the robot.

7. (Previously presented) An autonomous robot for traversing a conduit comprising:

a first section having a plurality of pitched wheels, said pitched wheels being oriented such that each of their axes defines a pitch angle greater than zero degrees and less than ninety degrees with respect to the longitudinal axis of the conduit;

a second section rotatably connected to said first section, said second section having a plurality of wheels aligned parallel to the longitudinal axis of the conduit; and

means for causing rotation of one of said first and second sections relative to the other of said first and second sections;

wherein said relative rotation of said first and second sections provides locomotive motion of the robot; and

wherein at least one wheel is moveable between a first position in which all of said wheels on the same section contact said conduit and a second position in which at least one of said of said wheels is retracted.

8. (Original) The robot according to claim 7 wherein the retraction distance of said at least one wheel is equal to at least one-third the diameter of the wheel.

9. (Original) The robot according to claim 8 wherein the retraction distance of said at least one wheel is equal to at least one-half the diameter of the wheel.

10. (Original) The robot according to claim 8 wherein the retraction distance of said at least one wheel is such that the diameter of the robot is decreased by at least 20 percent upon wheel retraction.

11. (Original) The robot according to claim 1 wherein said wheels have notched traction surfaces.

12. (Original) The robot according to claim 1 wherein at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit.

13. (Original) The robot according to claim 1, further comprising at least two optical encoders.

14. (Original) The robot according to claim 1 wherein the robot is no more than six inches in diameter.

15 (Currently amended) An autonomous robot for traversing a conduit comprising:

a body; and

a drive system capable of extracting energy from a flow of fluid through the conduit and using the energy to advance the body along the inside of the conduit, said drive system including at least one set of pitched wheels mounted on said body, each of said pitched wheels being positioned at a different point along the length of the robot such that no two pitched wheels in said set are at the same point along the length of the robot;

wherein at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit.

16. (Original) The robot according to claim 15 wherein said drive system includes a plurality of pitched wheels that are each positioned at a different point along the length of the robot.

17. (Original) The robot according to claim 16 wherein said pitched wheels are each positioned at a different point about the axis of the robot.

18. (Original) The robot according to claim 16 wherein said pitched wheels define at least one helical row.

19. (Original) The robot according to claim 18 wherein adjacent pitched wheels are spaced 180 degrees apart about the axis of the robot.

20. (Previously presented) An autonomous robot for traversing a conduit comprising:

a body; and

a drive system capable of extracting energy from a flow of fluid through the conduit and using the energy to advance the body along the inside of the conduit, said drive system including at least one set of pitched wheels mounted on said body;

wherein at least one component of the robot has an outer diameter that substantially corresponds to the inside surface of the conduit and the robot includes at least one internal passageway that allows fluid to flow along the length of the robot without having to pass between said at least one component and the inside surface of the conduit; and

wherein at least one wheel is moveable between a first position in which all of said wheels on the same section contact said conduit and a second position in which at least one of said of said wheels is retracted.

21. (Original) The robot according to claim 20 wherein the retraction distance of said at least one wheel is equal to at least one-third the diameter of the wheel.

22. (Original) The robot according to claim 21 wherein the retraction distance of said at least one wheel is equal to at least one-half the diameter of the wheel.

23. (Original) The robot according to claim 22 wherein the retraction distance of said at least one wheel is such that the diameter of the robot is decreased by at least 20 percent upon wheel retraction.

24. (Original) The robot according to claim 15 wherein said wheels have notched traction surfaces.

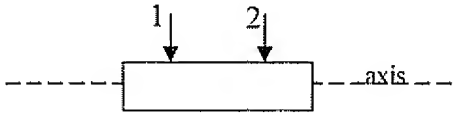
25. (Original) The robot according to claim 15, further comprising at least two optical encoders.

26. (Original) The robot according to claim 19 wherein the robot is no more than six inches in diameter.

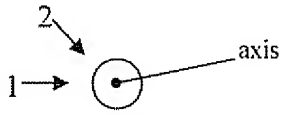
X. EVIDENCE APPENDIX

In order to facilitate an understanding of the arguments presented herein the phrases used in the present claims are illustrated below:

- "along the length of the robot" refers to distance from one end of the robot as shown below



- "azimuthal position" refers to angular position around the axis of the robot, as shown below



XI. RELATED PROCEEDINGS APPENDIX

None.